Successful management of iatrogenic retrograde dissection into the aortic root

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Introduction

Iatrogenic retrograde dissection (IRD) into the aortic root is a rare and potentially catastrophic complication of coronary angiography (CAG) and percutaneous transluminal coronary angioplasty (PTCA) (1). We report two cases with IRD who were successfully managed.

Case Reports

Case-1

A 60-year-old male patient with persistent chest pain was admitted to our hospital with non-STEMI. CAG performed via the right femoral approach and decided to LAD mid critical lesion intervention. The left main coronary artery (LMCA) was cannulated with a 6F JL4-guiding catheter, and a stent was successfully deployed in an LAD lesion. A circumflex (Cx) proximal flow-limiting dissection was detected in control images after LAD stent deployment. Following the decision of intervention 0.014 floppy guidewire selected and 2.75- x 24-mm stent was implanted after crossing the Cx dissection segment. A dissection originating from LMCA through ascending aorta (AA) was unexpectedly observed in control images (Video 1). The patient was administered synchronized electrical cardioversion four times owing to ventricular tachycardia. While administering the electrical shocks, a 3.0- x 24-mm stent was urgently deployed in LMCA (Fig. 1a–d). Thus, ventricular tachycardia was successfully terminated by cardioversion, and a sinus rhythm was recovered after immediate stenting of LMCA. In control angiographic images, an approximate 25-mm flap was detected in AA. After hemodynamic stabilization, computed tomography (CT) was performed to evaluate AA for dissection (Fig. 2a–c). CT was performed 0-6-36 h after the procedure. A 26-mm subtle-discrete flap localized at the aortic valve level was detected using CT; thus, we decided to follow-up the patient. After 1-year follow-up, the patient had no complaints and no signs of IRD progression using CT.

Case-2

A 48-year-old male patient with dextrocardia and prior history of anterior MI presented with unstable angina. CAG was performed via the right femoral approach using a 6F sheath. RCA was cannulated using a 6F-AL1 catheter, and an estimated 80% lesion was angiographically observed in RCA. Forthwith, the patient experienced chest pain, and dissection through AA was demonstrated (Video 2). PTCA was decided as the therapeutic option, and a 0.014 floppy guidewire was selected and 4.0- x 30-mm stent was implanted in the RCA ostium (Fig. 3a–d). CT was urgently performed, and 54-mm sized aortic aneurysm and 95-mm-sized IRD segment were observed (Fig. 4a–e). The patient was asymptomatic at the 6-month follow-up following aortic aneurysm surgery because of the extent of IRD.

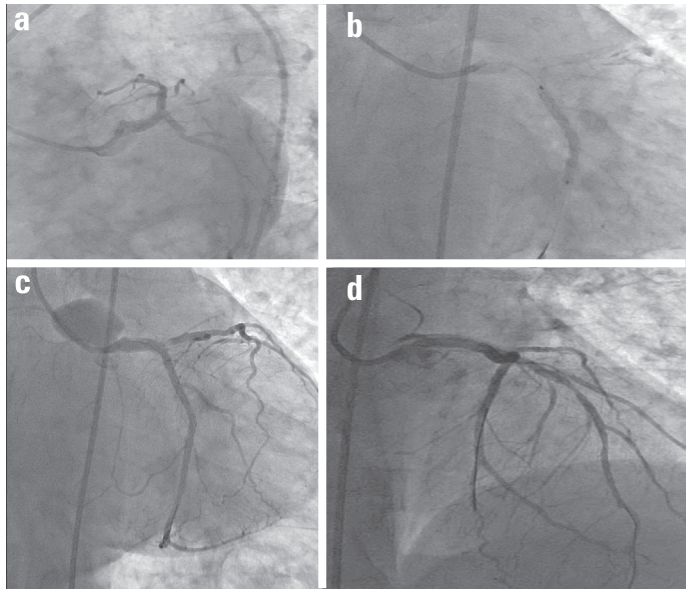

Figure 1. Images of the coronary angiogram: case 1. (a) Circumflex (Cx) dissection segment. (b) Cx stenting. (c) Dissection originating from the left main coronary artery (LMCA) through the ascending aorta. (d) After successfully stenting LMCA

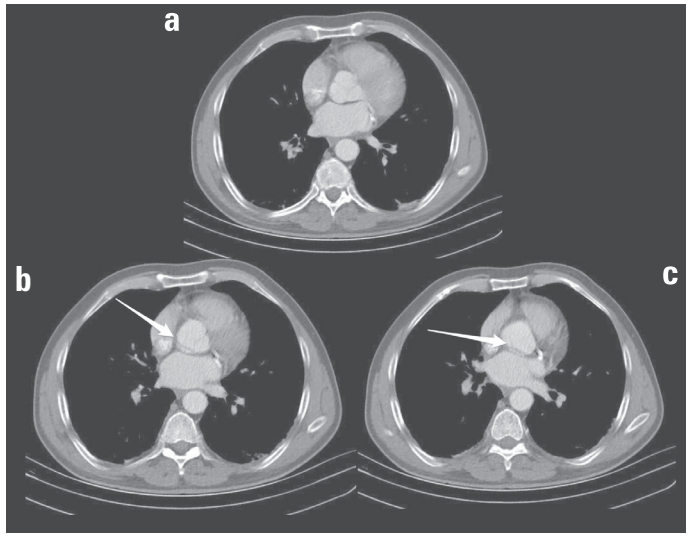

Figure 2. Images of computed tomography (CT): case 1. (a) Contrast-enhanced CT obtained at the level of the aortic arch. (b) Horizontal image of the ascending aorta. (c) A 26-mm dissection flap at the level of aortic arch

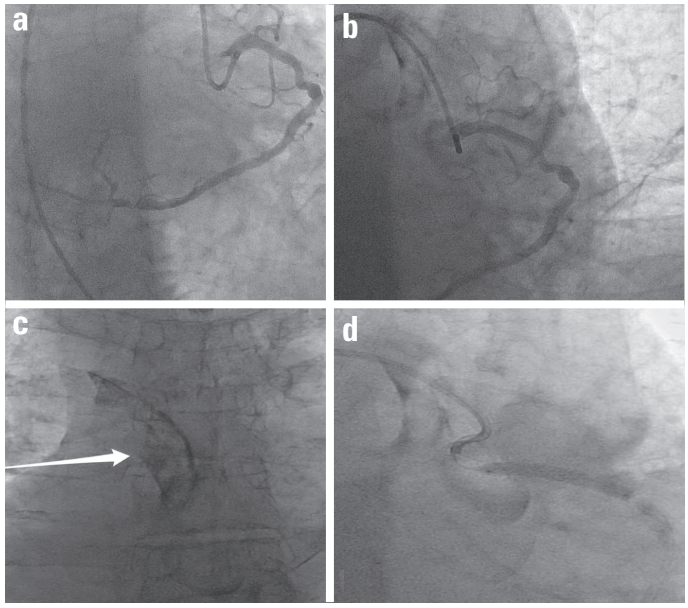

Figure 3. Images of the coronary angiogram: case 2. (a) Right coronary artery (RCA) image. (b) Dissection from RCA through the ascending aorta. (c) Dissection segment in the ascending aorta. (d) RCA osteal stenting

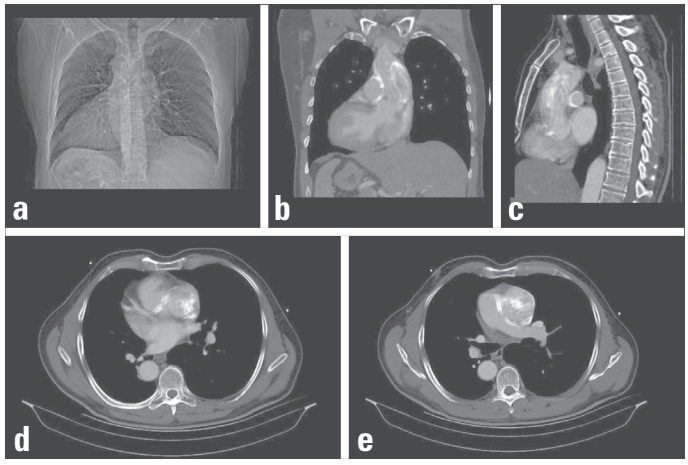

Figure 4. Images of CT: case 2. (a) CT topogram (dextrocardia). (b) Coronal image of the ascending aorta. (c) Sagittal image of the ascending aorta. (d) Horizontal image of the ascending aorta. (e) Horizontal image of the ascending aorta

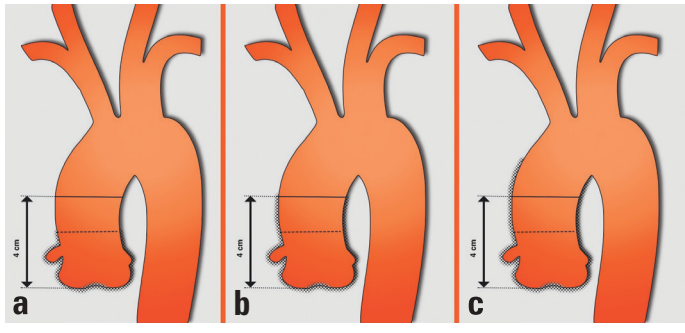

Figure 5. Proposed classification scheme by Dunning et al. (a) Class 1 was defined as a focal dissection restricted to the ipsilateral sinus valsalva. (b) Class 2 extends up the aorta but <40 mm. (c) Class 3 is the most extensive dissection extending from the sinus valsalva up to the ascending aorta of >40 mm

Discussion

IRD should be considered because it is a devastating complication of CAG. Clinical manifestation varies from an asymptomatic angiographic finding to a complete hemodynamic collapse owing to the closure of the coronary ostium (2, 3). In addition, the Amplatz catheter, extra backup catheter, or small Judkins catheters, stiffer guide wires, unusual coronary angulation, operator inexperience, vigorous hand injection of contrast, and presence of osteal atherosclerosis have all been associated with an increased risk for dissection (4, 5). As in our cases, heavy calcification or unusual angulation in the coronary often require Amplatz/extra backup catheters and aggressive manipulation. Avoiding aggressive manipulations or a deep engagement of catheters and maintaining a steady tension on the guiding catheter while the angioplasty balloon is withdrawn are cautious techniques that can minimize IRD occurrence (6). In addition, a preliminary risk assessment of procedures/patients and recognition of early signs of dissection are crucial for managing this complication. An immediate percutaneous coronary stenting is necessary to seal the entry point of the dissection (4). For further evaluation, subsequent noninvasive imaging of the residual aortic extension of the dissection can be safely performed with CT after hemodynamic stabilization (3, 4, 7).

Furthermore, Dunning et al. (8) graded IRD according to the level of the most superior extent of the intimal flap (Fig. 5a–c). The best treatment of class 1 and 2 dissection appears to be stenting of the intracoronary entry point when possible and a close clinical follow-up, whereas retrograde dissection that extends for >40 mm in length usually requires surgical intervention (3, 4, 8, 9). Furthermore, if it causes clinical instability, surgery is the only life-saving treatment.

In our first case, hemodynamic instability occurred because of ventricular tachycardia, although IRD was present at the focal area (class 1), and the patient was effectively treated by stenting LMCA. Conversely, in our second case, an extensive IRD (class 3) was observed without hemodynamic compromise, and RCA was sealed by coronary stenting. Hence, coronary malperfusion owing to IRD is the major determinant of clinical presentations. Although Dunning's classification cannot predict clinical manifestations, it provides a framework for treatment and prognosis when dissection occurs.

Immediate stenting of ostiums to sustain hemodynamic stabilization was necessary for our cases. After stent implantation, imaging of the residual aortic extension was necessary for IRD management. Aortic evaluation was performed using CT, and we graded both patients according to Dunning's classification. Meanwhile, we decided to follow-up our first case even if he had an unstable presentation and our second case was referred for aortocoronary surgery because of the extent of retrograde dissection. Both patients remain well at the 6-month follow-up.

Conclusion

IRD management initiates with immediate sealing of the coronary entry. After clinical stabilization, imaging the extent of dissection flap and classifying the dissection are mandatory for making a decision about prognosis and treatment.

Video 1. Dissection images of the angiogram: case 1.
Video 2. Dissection images of the angiogram: case 2.

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